COTTAGE POLLUTION CONTROL PROGRAM

TOBACCO LAKE

MANITOULIN ISLAND

July 1978

Ministry of the Environment
Ontario

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. S. Scott,
Deputy Minister

COTTAGE POLLUTION CONTROL PROGRAM

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MANITOULIN ISLAND

JULY 1978

Prepared by:

SUDBURY DISTRICT ABATEMENT STAFF

NORTHEASTERN REGION

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INTRODUCTION

This Cottage Pollution Control Survey was conducted by the Abatement Section of the Ministry of the Environment in response to a request from the Manitoulin Planning Board. The Board indicated that they would like a survey of the sewage disposal systems conducted of the cottages on either Tobacco or Silver Lake. Tobacco Lake was selected by Ministry staff due to the density of development, the number of cottages, the size of the cottage lots, the size of the lake, and its proximity to the Town of Gore Bay.

The Cottagers Association on Tobacco Lake has also been part of a self-help program, supported by this Ministry, for some time. The program is explained and the data collected summarized and interpreted in Appendix II.

RECOMMENDATIONS

The following recommendations are presented based on this survey:

1. While it appears that (at the present usage) the sewage disposal systems are adequately treating the sewage, it is recommended that the existing level of use not be increased.

2. Township By-law 74-7 restricting the use of holding tanks be amended to allow the installation of holding tanks for existing dwellings.

3. The Cottagers Association erect a sign at the dug well in Area A indicating that "the water should be boiled prior to human consumption".

4. Further samples for bacteriological examination be collected from the spring to monitor the bacteriological water quality on a continuing basis. These samples should be collected monthly.

5. Those systems which were classified as seriously substandard, nuisance (wash water) and nuisance (toilet) be brought up to present standards.

6. The Cottagers Association continue to collect water samples for the self-help program. The frequency of the sampling should be increased to once per week.

LAKE DESCRIPTION

a) Location

Tobacco Lake is located in Gordon Township, District of Manitoulin, at latitude 45° 51', longitude 82° 27'. The lake is located about 10 miles south of the Town of Gore Bay. The location of the lake is shown on Figure 1.

b) Development

The 63 cottages on this lake are concentrated along the eastern side of the lake. This area is divided into three separate areas identified as A, B and C on Figure 2. Only 3 cottages are situated on the western shore of the lake.

c) Soil and Topography

In general, the soil surrounding the lake is sandy in nature. The topography near the shoreline is generally flat with some areas along the eastern shore where it is slightly elevated from the lake. Some areas along the shoreline are poorly drained. The western shore, in the area where the cottages are found, consists of a narrow level area adjacent to the lake backed by a bluff.

INSPECTION PROCEDURE

The survey procedures can be described in terms of Lot Inspections and Water Sampling.

a) Lot Inspections

The lot inspections and occupant interviews were conducted between 10:00 a.m. and 5:00 p.m. during the Tuesday, July 24, to Friday, July 28, 1978, period.

The Ministry staff conducting the survey were divided into two teams. The teams, of two people each, leap-frogged each other conducting inspections and interviews on alternate lots. At

each lot inspected, the Cottage Pollution Control form (M.O.E. 1079 5/760) was completed by the teams (Appendix IV) who also:

Recorded the following data:

i) Establishment's owner and address.

ii) Type of sewage disposal and its adequacy.

iii) Type of water supply and treatment.

Prepared a plot plan showing:

i) location of the

a) cottage

b) roads

c) sewage disposal system

d) source of water supply

e) lake

f) other bodies of water

ii) general topography

iii) other buildings.

b) Chemical and Bacteriological Water Samples

1) Lake Water Samples

Twenty-nine bacteriological and nineteen chemical water samples were collected from the lake in front of selected cottages at a distance of 5 to 10 feet from the shoreline.

The bacteriological samples were examined at the Ministry of Health Laboratories in Sudbury for Total coliform and Fecal coliform organisms. The chemical samples were analyzed at the Ministry of the Environment's Laboratory in Toronto for bioche-

mical oxygen demand, total and dissolved solids, colour, turbidity, chloride, sodium, potassium, free ammonia, total Kjeldahl nitrogen, nitrite, nitrate, total and dissolved phosphorus, alkalinity and conductivity.

2) Drinking Water Samples

Water samples for chemical analysis and bacteriological examination were collected from each of the two communal sources of drinking water - a dug well and a spring. The bacteriological samples were examined at the Ministry of Health Laboratory for Total coliform and Fecal coliform organisms while the chemical samples were analyzed at the Ministry of the Environment Laboratory for hardness, alkalinity, iron, chloride, pH, conductivity, apparent colour, turbidity, sodium, potassium, calcium, magnesium, sulphate, total organic carbon, total phosphorus, nitrate, total Kjeldahl nitrogen and manganese.

No samples of drinking water were collected where the cottage resident was using the lake as a source of domestic water.

RESULTS AND DISCUSSION

a) Lake Water Quality

Tables 1, 2 and 3 summarize the results of the chemical analyses and bacteriological examinations of the 48 lake water samples.

The chemical data (Table 1) clearly indicates that the lake water quality is very good and complements the self-help program data which also attests to good water quality i.e. moderate clarity and low chlorophyll a concentrations (see Appendix II).

The Total coliform and Fecal coliform results for the samples (Tables 2 and 3) may be compared with this Ministry's recommended limit for recreational use of 1000 Total coliform and 100 Fecal coliform organisms per 100 ml. Making this comparison, it is evident that all the samples collected are within these limits and that the water is suitable for recreational use.

b) Drinking Water Quality

Drinking water sources summarized in Table 4 include a communal spring, a communal well, the lake and carry-in supplies. Approximately 37% of the residents were listed as "source unknown" in the survey (see below for explanation).

i) Communal Spring Supply.

During the survey it became apparent that a spring located along the access road to Area 3 was the source of drinking water (potable water) for the majority of the cottage dwellers from all three areas. The survey results given in Table 4 show that 46% of the people interviewed use the spring as the source of drinking water. It was also apparent from comments made to the survey teams that a great many of the people listed in the "source unknown" section of the table

also obtain their drinking water from the spring.

Bacteriological and chemical analysis data is summarized in Table 5. With reference to this table, it is noted that the water quality of the spring complies with all criteria for both chemical and bacteriological quality and hence is acceptable for potable use.

ii) Communal Well Supply

The second communal source used by some residents of Area A was a dug well located along the access road to that area. Its use, however, is small when compared with the use of water from the spring.

The dug well contained water which was acceptable chemically for potable use; however, a Total coliform count of 12 was found. This well is located in the edge of a low wet area, on the edge of a road and is surrounded by tall weeds. The well casing was tilted. It appeared that surface water would have access to the well, thereby contaminating it. Water taken from the dug well should be disinfected (i.e. boiled) prior to consumption.

iii) Lake Supply

It is the policy of this Ministry to instruct any person using a surface water as the source of potable water to disinfect the water prior to consumption.

Total and Fecal coliform organisms can be expected to be found occurring naturally in a surface water. The organisms will be floating freely in the water and therefore not be evenly distributed. A water sample collected for bacteriological examination may contain no organisms but this is not a guarantee that a second sample collected very shortly after the first would not contain organisms. For this reason no bacteriological samples were collected from the cottages where the residents were using the lake as a source of drinking water.

Chemically, the lake water quality complies with all criteria and is of acceptable quality for potable use.

c) Sewage Disposal

Sewage disposal systems are classified by type (Table 6), location (Table 7) and by acceptability (Table 8).

1) Type

With reference to Table 6 which is a tabulation of the type of systems used to dispose of human waste and wash water, the total number of systems in the table does not correspond to the number of cottage lots inspected. This difference is due to many lots having both Class I and II systems.

i) Holding Tanks

In Table 6, six percent of the people interviewed indicated that holding tanks were used for sewage disposal. From the

examination of a number of these holding tanks, it was obvious that they would not meet present standards. They were inadequate in; (1) size, (2) construction materials, (3) no lock out device.

ii) Septic Tanks and Tile Field Systems

Only a few of the septic tank systems conform to present regulations. The majority of the systems inspected appear to be cesspools with a limited amount of tile. The tanks associated with these systems are very small.

iii) Pit Privies

The pit privies were generally found to be in fair condition; however, the majority of the systems do not meet present standards. No obvious nuisances were found such as ponding of sewage or extreme total or fecal coliform results in the surface water adjacent to them. The majority of the problems were that the privies were not raised above ground level on a gravel mound and the ventilation holes were not screened.

2) Location

Table 7 includes only that sewage disposal system which is closest to the lake (or other body of water) if there is more than one system on a lot.

With 71% of the sewage/waste water disposal systems being greater than 50 feet from the lake and 30% of the lots containing pit privies, there is little chance of sewage

gaining access to the lake thereby causing a deterioration of water quality. Twenty-nine percent of those within 50 feet of the lake are built on the marine allowance. There is some danger of contamination from these systems if large amounts of waste water are directed to them.

3) Acceptability

After the lot inspections were completed the survey team classified the sewage systems into a number of classifications depending on adequacy and performance of the system. The results of this classification process are given in Table 8.

A number of cottages had more than one system; therefore, the number of classifications made are greater than the number of lots inspected.

The majority of nuisance (wash water) and nuisance (toilet) classifications were due to faulty construction and/or lack of maintenance. Notices, as well as diagrams, showing properly constructed privies and leaching pits were left at the cottages where the problems were noted.

The majority of the lots (55%) were found to be serviced by systems categorized by either satisfactory or satisfactory performance.

It should be noted; however, that the classification satisfactory performance is a classification where the system does not meet present standards but at the time of the inspection was performing satisfactorily. If its usage

should be increased; however, it may become a nuisance or direct polluter system. The classification of a system as satisfactory performance is not a statement of official approval.

d) Lot Size

In the past, fifteen thousand square feet has been considered as the minimum area on which a septic tank system and a dug well could be located, and still maintain the distance requirements as required in Ontario Regulation 229/74.

Table 8 which is a summary of the survey data collected on lot size shows that 84% of the lots (where the lot size could be determined) were less than 15,000 square feet in area. The Ministry staff conducting the survey felt that many of the lots, where the lot size could not be determined, were also less than 15,000 square feet in area. These small lots were found in Areas B and C. Area A had been more recently developed and the lots were at least 15,000 square feet in area.

e) Cottage Use

Most people interviewed reported that they use their cottages only for short periods of time between June and August. This rather limited use allows the sandy soil to filter the waste it receives and then allows the soil a rest period.

The area has also been developed without destroying a great many trees. These trees and other vegetation will use the nutrients in the sewage and/or waste water for growth before they can enter the lake.

CONCLUSIONS

As a result of this survey, it is concluded that:

1. 84% of the lots were less than 15,000 square feet in area.

2. 29% of the cottages were built on the 66' marine allowance and not on the lot owned by the people.

3. The majority of the sewage disposal systems (54%) were found to be adequate. This performance could be expected to deteriorate if their usage was increased.

4. The spring water quality was found to be acceptable for potable use.

5. The lake water quality is acceptable chemically for potable use. However, in keeping with this Ministry's policy, it must be disinfected prior to potable use.

6. The communal dug well on the northern part of the lake was found to be contaminated with total coliform organisms.

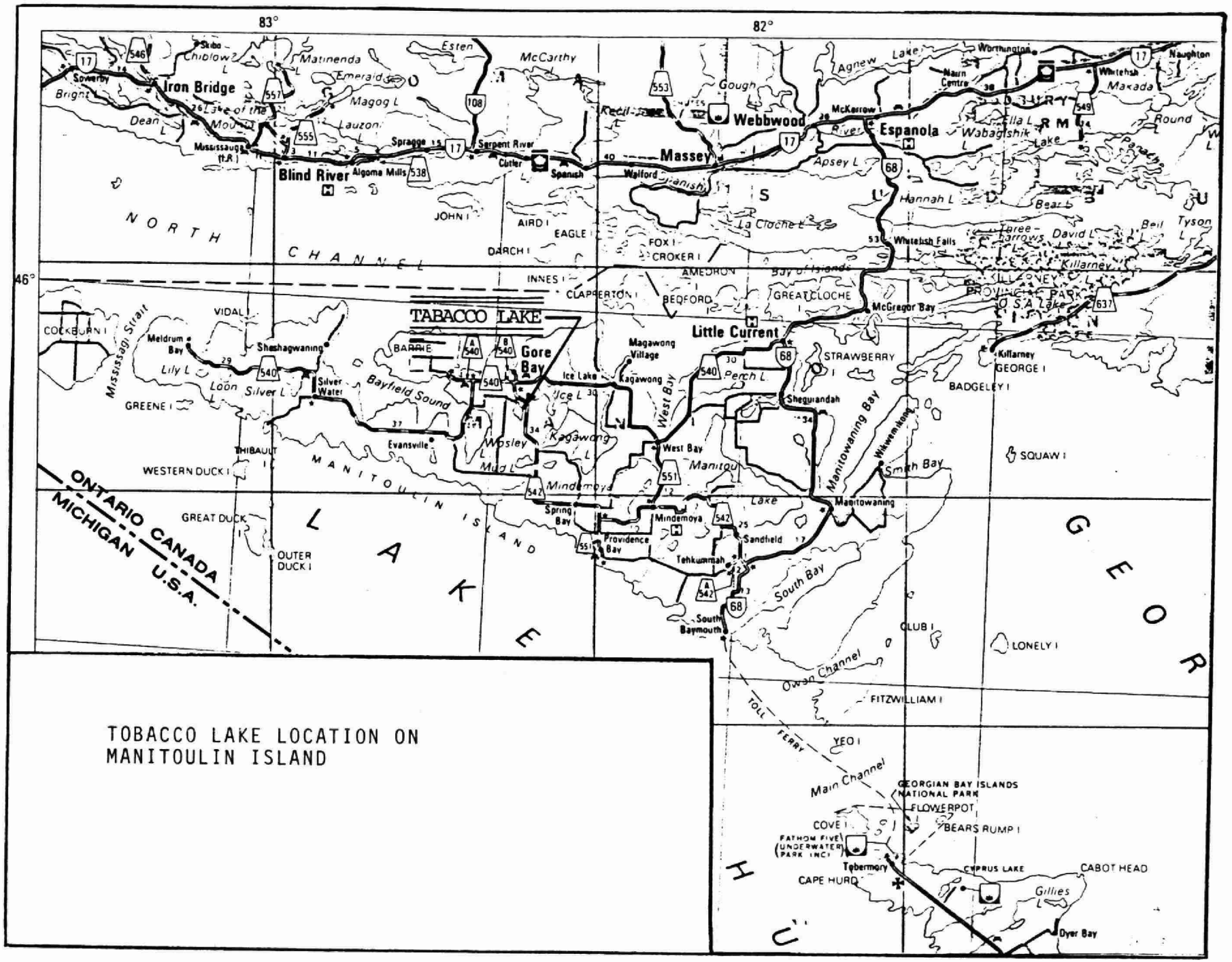
7. The water quality of the lake was found to be very

good. The results of the self-help program placed the lake in a level one category.

8. All the bacteriological samples collected from the lake during the survey were within this Ministry's limits for recreational use.

APPENDIX I

FIGURES AND TABLES



TOBACCO LAKE LOCATION ON MANITOULIN ISLAND

FIGURE 1

FIGURE 2

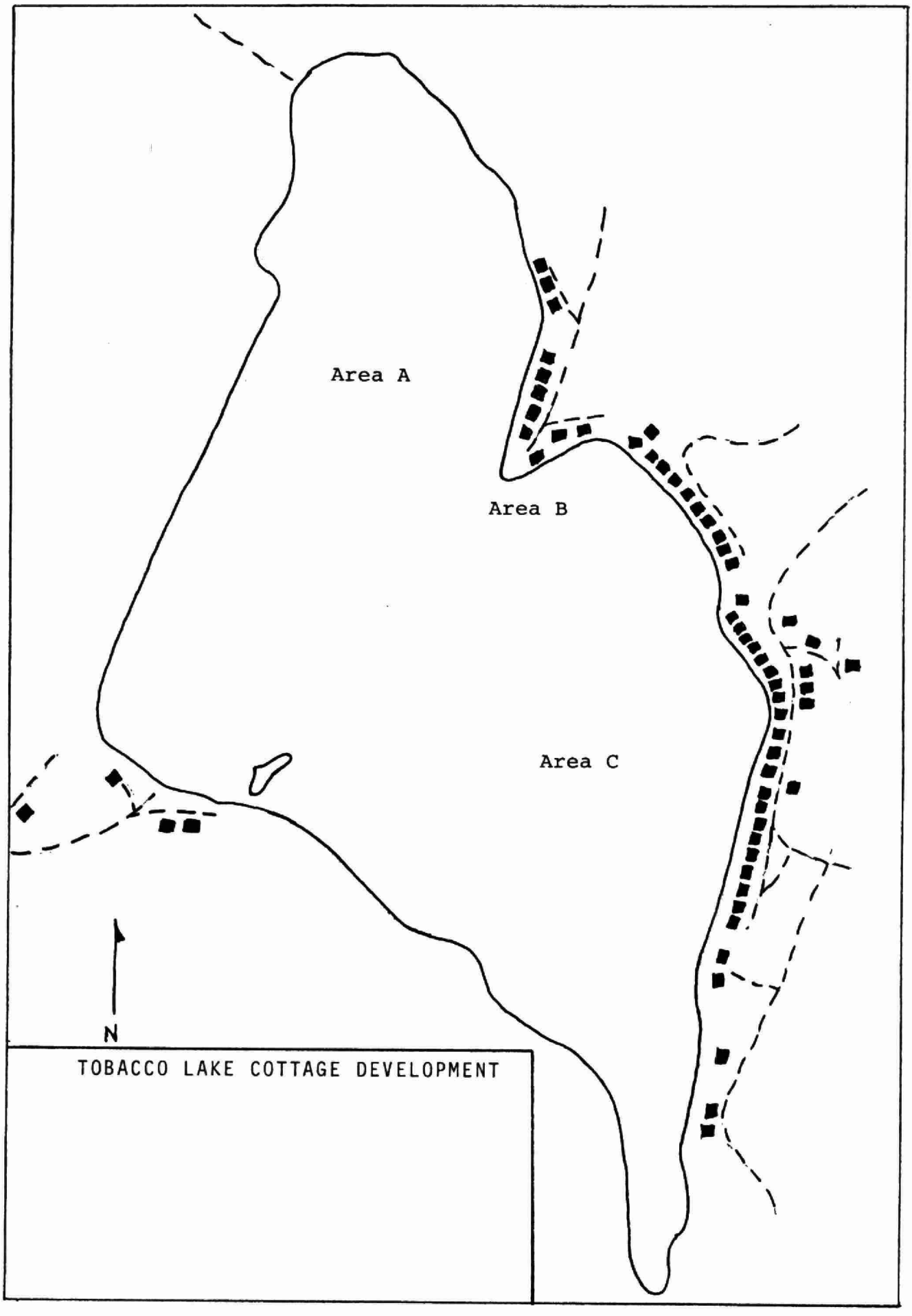


TABLE 1

Lake Water Quality (Chemical)[2]

Parameter	Concentration		
	Minimum	Maximum	Mean
Biochemical Oxygen Demand	0.2	1.4	0.4
Solids			
Total	184	252	192
Suspended	0.8	11	3
Dissolved	182	251	189
Colour+	0	20	12.6
Turbidity++	1.1	2.4	1.9
Chloride[1]	-	-	3.0
Sodium[1]	-	-	1.2
Potassium[1]	-	-	0.55
Nitrogen			
Free Ammonia	0.004	0.06	0.012
Total Kjeldahl	0.48	0.12	0.32
Nitrite	< 0.001	0.003	0.001
Nitrate	0.005	0.02	0.008
Phosphorus			
Total	0.004	0.04	0.009
Dissolved[1]	-	-	0.001
Alkalinity[1]	-	-	144.6
Conductivity+++	280	295	287

NOTE

1) Three samples only.

2) All concentrations in mg/: except as noted below:

\+ Hazen Units
++ Formazin Units
+++ micro-mhos/cm

TABLE 2

Bacteriological Examination Results

In Total Coliform Organism

counts/100 millilitres

Range of Counts	No. of Samples	% of Samples
0	8	27.5
1 to 10	13	45
11 to 100	6	20.5
101 to 1000	2	7
1001 and greater	0	0

TABLE 3

Bacteriological Examination Results

In Fecal Coliform Organism

counts/100 millilitres

Range of Counts	No. of Samples	% of Samples
0	14	48
1 to 10	14	48
11 to 100	4	4
101 and greater	0	0

TABLE 4

Sources of Drinking Water

Type	User Distribution	
	Number	%
Well	2	3
Spring	29	46
Lake	3	4
Carry-in	6	10
Not Reported	23	37

TABLE 5

Results of Analysis of Water Samples

From Communal Sources of Water

Parameter	Limit	Well	Spring	Lake
Hardness	*	280	255	-
Alkalinity	*	242	230	144.6
Iron	0.3	0.16	0.16	-
Chloride	250	5	5	3.0
Conductivity+	*	490	450	287.0
Sodium	*	2	2	1.2
Potassium	*	1.3	0.5	0.55
Sulphate	250	28	20	-
Nitrate	10 as N	0.1	0.1	0.008
Manganese	0.05	0.004	0.001	-
Total Organic Carbon	5	2.0	2.4	-
Total Phosphorus	*	< 0.02	< 0.02	0.009
Calcium	*	67	58	-
Magnesium	*	27	27	-
Fluoride	1.2 aver.	-	0.1	-
Total Coliform Organisms++	0	12	0	<2
Fecal Coliform Organisms++	0	0	0	0

* No Limit Set

\- Analysis not performed

NOTE:

1) All concentrations in mg/L except as noted below:

\+ micro-umhos/cm
++ counts/100 millilitres

2) * No criteria published.

3) \- Analysis not performed.

TABLE 6

Sewage & Wash Water Disposal

M.O.E. Classification	Common Name	Number of Systems	% of Systems
Class VI	Proprietory aerobic sewage treatment unit	0	0
Class V	Holding Tank	6	6
Class IV	Septic Tank/Tile Field System	19	20
Class III	Cesspool	4	4
Class II	Leaching Pit	20	21
Class I	Pit Privy	29	30
Unknown System		8	9
No Disposal System	Wash Water	8	9

TABLE 7

Distance from Sewage Disposal System to Lake

Distance	No. of Systems	% of Systems
Less than 25'	6	11
26' to 50'	10	18
Greater than 50'	40	71

TABLE 8

SYSTEMS ACCEPTABILITY CLASSIFICATION

Classification*	Number of Systems	%
Satisfactory	4	6
Satisfactory Performance	33	49
Seriously Substandard	1	1
Nuisance (Wash Water)	11	16
Nuisance (Toilet)	2	3
Direct Polluter	0	0
Unclassified	17	25

* Defined in Appendix III.

TABLE 9

Lot Size

Range	Number of Lots	% of Lots
Less than 2500 sq. ft.	8	13
Between 2501 and 5000 sq. ft.	5	8
Between 5001 - 10,000 sq. ft.	6	10
Between 10,001 - 15,000 sq. ft.	7	11
Greater than 15,000 sq. ft.	10	16
Unknown	27	43

APPENDIX II

Self-Help Program

A cottagers association which is participating in this program is required to collect water samples for chlorophyll *a* and measure secchi disc readings at regular intervals during the summer months. The information derived from this program is dependent on the amount of effort put into it by the association.

A secchi disc is a 20 cm diameter black and white segmented disc. It is lowered into the lake until it disappears and then drawn-up again until it reappears. These distances are averaged to give the secchi disc reading. This is a measure of the water clarity. The chlorophyll *a*, determined in the laboratory, is a measure of the suspended algae density. These parameters are used to determine the eutrophic status of the lake.

This data is summarized in the Ministry of the Environment report dated 1974 entitled Enrichment Status of Seventeen Lakes in the Northeastern Region of Ontario.

Tobacco Lake contains water with moderate clarity and a low chlorophyll *a* concentration. The lake therefore contains water of good quality.

The self-help program should be continued with samples being collected on a weekly basis. The longer the sampling continues the more accurate the classification will be.

APPENDIX III

SEWAGE SYSTEM CLASSIFICATION

The sewage disposal systems of all the cottages surveyed were classified into one of the following categories:

Class 1 - Satisfactory: The systems met the provincial standards at the time of the survey, relating to materials of construction, sizing, distances from water courses, as outlined in Regulation 229, The Environmental Protection Act and were being properly maintained.

Class 2 - Satisfactory Performance: No obvious signs of pollution or of system malfunction were noted at the time of inspection. The disposal system may be antiquated or may not precisely meet regulations, but no fault in operation was noted.

Class 3 - Seriously Substandard: Systems with serious defects in construction, materials of construction, maintenance, sizing or systems located in poor soil conditions and/or closer than the required distances to water bodies. An immediate health or environmental concern existed.

Class 4 - Nuisance - (Wash Water): A system allowing the disposal of sink water or laundry water onto the ground surface. As well as a potential health hazard, such discharges allow the untreated release of nutrients which may encourage weed growth and affect the aesthetics of the receiving water body.

Class 5 - Nuisance (Toilet & Solid Waste): Systems including poorly constructed or maintained privies. Also included in this category are garbage, scrap, etc., which allow conditions suitable for the procreation of vermin.

Class 6 - Direct Polluter: A system permitting human waste to directly enter the groundwater or surface water through piping or runoff on the ground surface, or after inadequate treatment.

Class 7 - Unclassified: Systems which could not be satisfactorily classified due to insufficient information or systems which at the time of inspection were under construction.

APPENDIX IV

COTTAGE POLLUTION CONTROL FORM

Ministry of the Environment

Ontario

COTTAGE POLLUTION CONTROL PROGRAM

ESTABLISHMENT IDENTITY

LAKE OR RIVER No (1–6) | ESTABLISHMENT SURVEY No (7–11) | SUB-EST No (12–13) | TRANS CODE (14–15)

ESTABLISHMENT DESCRIPTION

CARD No [0 1] (16–17) | HYDRO METER No (18) | DATE OF INSPECTION DAY MONTH YEAR (26) | LOT SIZE (32) | UNIT OF LOT SIZE SQ FT (40) ACRES (41) | USE (42) | No. OF OCCUPANTS AVERAGE (43) MAXIMUM (47) | No. BEDROOMS (51) | ESTABLISHMENT TYPE (53)

ACCESSIBLE BY ROAD Yes (55) No (56)

NAME OF ROAD _____

USE
1 SUMMER ONLY
2 YEAR ROUND
3 SUMMER/OCCASIONAL WINTER
4 PREDOMINANT WINTER
5 NOT IN USE—CLOSED
6 UNDER CONSTRUCTION

TYPE OF ESTABLISHMENT
01 PRIVATE COTTAGE
02 CABIN ESTABLISHMENT
03 COTTAGE ESTABLISHMENT
04 CAMP
05 PICNIC AREA/PUBLIC PARK
06 MARINA
07 HOTEL/MOTEL
08 RESTAURANT
09 STORE
10 FARMHOUSE
11 CLUB
12 INDUSTRIAL
13 BOATHOUSE
14 PERMANENT HOME
15 CAMPGROUND/TRAILER PARK
16 OTHER

ESTABLISHMENT OWNER

TITLE (57) | INITIALS (61) | SURNAME (64–80)

TELEPHONE No _____

IF PERSON INTERVIEWED IS NOT OWNER, NAME _____

MAILING ADDRESS

CARD No [0 2] (16–17)

OWNER'S PERMANENT MAILING ADDRESS (18 / 42 / 66)

CLASSIFICATION

PRELIMINARY (79) FINAL (80)

1 SATISFACTORY
2 SATISFACTORY PERFORMANCE
3 SERIOUSLY SUBSTANDARD
4 NUISANCE (WASH WATER)
5 NUISANCE (TOILET, SOLID WASTE)
6 DIRECT POLLUTER
7 UNCLASSIFIED TEMPORARILY)
8 UNCLASSIFIED

INITIALS _____

DESCRIPTION OF FACILITIES

CARD No [0 3] (16–17)

	FIXTURES & APPLIANCES												TOILETS								
	BATHROOM WASH BASIN	DISHPAN	BATH WITH SHOWER	BATH	STALL SHOWER	KITCHEN SINK	AUTOMATIC DISHWASHER	WASHING MACHINE (Wringer)	WASHING MACHINE (Auto.)	LAUNDRY TUB	GARBAGE GRINDER		STANDARD FLUSH	URINAL	LOW VOLUME FLUSH	PIT PRIVY	VAULT PRIVY	AQUA PRIVY (Pail-a-day)	INCIN TOILET—GAS	INCIN TOILET—ELECT	CHEMICAL TOILET	OTHER (Specify)
QUANTITY	(18)						(25)						(30)			(35)			(40)			

SLOPE OF LOT GROUND (53–56)

0-5% (Flat) | 5-10% (Moderate) | 10-20% (Mod Steep) | >20% (Steep)

DRINKING WATER

SOURCE PRIMARY (42) OTHER (43) | SOURCE IF IMPORTED (44) | TREATMENT PRIMARY (45) OTHER (46) | LAUNDRY DONE AT COTTAGE YES (47) NO (48) | PIPED WATER YES (49) NO (50) | REFUSE PRIMARY (51) OTHER (52)

DRINKING WATER SOURCE
1 LAKE
2 COTTAGE DUG WELL
3 COTTAGE DRILLED WELL
4 CISTERN FOR RAINWATER
5 MUNICIPAL
6 OTHER (SPECIFY)

DRINKING WATER TREATMENT
1 NONE
2 BOILED OR FILTERED AND BOILED
3 FILTERED
4 DISINFECTED BY CHLORINE
5 DISINFECTED BY OTHER MEANS
6 FILTERED AND DISINFECTED BY CHLORINE
7 FILTERED AND DISINFECTED BY OTHER MEANS
8 OTHER (SPECIFY)

REFUSE
1 TO MUNICIPAL DUMP
2 TO LOCAL DUMP
3 TAKEN HOME
4 DEPOSITED IN LAKE
5 DEPOSITED ELSEWHERE
6 BURIED ON LOT
7 BURNED/INCINERATED
8 OTHER (SPECIFY)

MOE 1079 5/76

SEPTIC TANKS

CARD No 0 4 (16 17)

TANK No (18) | CAPACITY: LIQUID (19) | TOTAL | GALLONS (21) | YEAR INSTALLED (25) | LAST YEAR CLEANED (27) | MATERIAL (29) | APPROVAL (30) | APPROV AGENCY (31)

(42) (43) (45) (49) (51) (53) (54) (55)

MATERIAL
1 CONCRETE
2 STEEL
3 FIBERGLASS
4 CONC BLOCK
5 OTHER (SPECIFY)

APPROVAL
1 NO REFERRAL
2 REFERRAL NOT YET APPROVED
3 NOT APPROVED
4 APPROVED

APP AGENCY
1 HEALTH UNIT
2 MIN OF ENV
3 MUNICIPAL

TILE FIELDS

FIELD No (32) | TOTAL LENGTH OF TILES (FT.) (33) | DISTANCE BETWEEN LINES (FT.) (37) | HEIGHT ABOVE LAKE (FT.) (39)

(56) (57) (61) (63)

BACTERIOLOGICAL SAMPLE RESULTS

CARD No 0 5 (16 17)

TOTAL COLIFORM: 18 | 27 | 36 | 45 | 54 | 69

FAECAL COLIFORM: 22 | 31 | 40 | 49 | 61 | 71 | LOC'N | D

1 to 9 — NORMAL LAKE OR RIVER SHORE SAMPLE No
D — DRINKING WATER
S — SEWAGE SAMPLE
C — CONTROL SAMPLE

EVALUATION OF SYSTEM

CARD No 0 6 (16 17)

DISTANCE TO
1. ALL MEASUREMENTS ARE SHORTEST DISTANCES
2. MEASUREMENT FROM POINT OF WASTE DISCHARGE ON GROUND SURFACE

SYSTEM No (18) | SYSTEM TYPE (19) | LAKE OR RIVER (FEET) (21) | STREAM ON OR ABUTTING LOT (FEET) (24) | DRINKING WELL (FEET) (27) | BUILDING (FEET) (30) | PROPERTY BOUNDARY (FEET) (32)

TYPE OF WASTE (34): TOILET | BATHTUB, SHOWER BATHROOM WASH BASIN | KITCHEN | LAUNDRY | UNKNOWN

CONSTRUCTION (39): POOR | INFERIOR MATERIALS | UNKNOWN CONSTRUCTION

OPER'N (42): SYSTEM OVERLOADED | SYSTEM ABUSED | UNKNOWN OPERATION

PERF (45): FIRST | SECOND

SYSTEM CLASSIFICATION

PERFORMANCE
1 POLLUTING DRINKING WELL
2 POLLUTING GROUND WATER
3 PONDING
4 EFFLUENT SURFACING
5 EFFLUENT BREAKING OUT
6 LEAKING
7 BAD ODOURS
8 NOT VERMIN PROOF

01 SEPTIC TANK
02 TILE FIELD
03 ON GROUND SURFACE
04 INTO LAKE RIVER OR LEACHING PIT
05 PIT PRIVY
07 CESSPOOL
08 HOLDING TANK
09 LAGOON
10 MUNICIPAL
11 REFUSE
12 OTHER SPECIFY

SOIL PROFILE

CARD No 0 7 (16 17)

SOIL TYPES
1 ORGANIC
2 GRAVEL
3 SAND
4 SILT
5 CLAY

HOLE 1 (IN TILE FIELD IF ONE EXISTS) | HOLE 2 (IN TILE FIELD IF ONE EXISTS)

	SOIL STRATUM (FT.)	MAINLY COMPOSED OF	WITH CONSIDERABLE AMOUNT OF	MINOR AMOUNT OF
FIRST	(18)	(20)	(21)	(22)
NEXT	(23)	(25)	(26)	(27)
NEXT	(28)	(30)	(31)	(32)
NEXT	(33)	(35)	(36)	(37)

	SOIL STRATUM (FT.)	MAINLY COMPOSED OF	WITH CONSIDERABLE AMOUNT OF	MINOR AMOUNT OF
FIRST	(42)	(44)	(45)	(46)
NEXT	(47)	(49)	(50)	(51)
NEXT	(52)	(54)	(55)	(56)
NEXT	(57)	(59)	(60)	(61)

(38) (40) DEPTH TO IMPERVIOUS LAYER OR DEPTH TO GROUND WATER (62) (64)

SOIL DEPTH RANGE OVER WHOLE PROPERTY: FT. (66) TO FT. (68)

SOIL IS: NATURAL (70) | FILL (71) | INSUFFICIENT SOIL (72) | UNSUITABLE SOIL (73)

RECOMMENDED ACTION AND COMMENTS (BY SUPERVISOR)

CARD No 0 8 (16 17)

CARD No 0 9 (16 17)

20 50 20 50

ESTABLISHMENT IDENTITY

LAKE OR RIVER No (1–6) | ESTABLISHMENT SURVEY No (7–11) | SUB-EST. No. (12 13) | TRANS CODE (14 15)

GLOSSARY

A. BACTERIOLOGICAL EXAMINATIONS

1. Coliform Bacteria

The direct search for a specific pathogen in water is too uneconomical and slow for routine control purposes. Instead water is examined for an indication of fecal contamination by using specific groups of bacteria as indicators. When these groups are found in the water it is assumed that the water is potentially harmful. The standard group of micro-organisms used as an indicator is the coliform group which includes all aerobic and facultative anaerobic, Gram-negative, nonspore forming, rod-shoped bacteria that ferment lactose with gas formation within 48 hours at 35°C. Organisms of the Escherchia coli strains which are usually of fecal origin, and of the intermediate and Aerobacter aerogenes strains which are usually but not always of soil, vegetable, or other non-fecal origin are included in this group.

1 (a) Total Coliforms

This group comprises species that are commonly associated with fecal matter (human and animal) and normal inhabitants of soil and vegetation. The presence of total coliforms in water may indicate contamination from soil runoff, or, less recent fecal pollution.

1 (b) Fecal Coliforms

These bacteria are mainly species associated with human and animal fecal matter. The presence of fecal coliforms in water indicates a relatively recent and near pollution input.

B. CHEMICAL ANALYSES

1. Alkalinity

Alkalinity is the measure of the power of a solution to neutralize hydrogen ions. It is used to define the buffering capacity (the capacity to resist changes in pH) of water. Alkalinity is expressed in terms of an equivalent amount of calcium carbonate. This does not necessarily imply that there is this much calcium carbonate in the water or that there is any at all. The alkalinity measurement represents the quantity of acid, expressed as calcium carbonate, needed to reduce the pH of a measured portion of sample 4.5. It is caused by the presence of carbonates, bicarbonates, and hydroxides, and to a lesser extent by the presence of borates, silicates, phosphates, and organic substances. Alkalinity is not considered detrimental to human health but it is generally associated with high pH values, hardness and excessive dissolved solids.

2. Colour - Apparent

Apparent colour includes colour due to dissolved solids and suspended matter. Surface water colour is due mostly to the presence of humic acids derived from decomposition of plant material. In groundwaters colour is usually due to the presence of iron and manganese. Most naturally coloured water (usually yellowish-brown) is harmless. The objective for domestic water supplies in Ontario is 5 Hazen Units.

3. Chloride

Chloride concentrations in water supplies may result from contact with natural minerals, industrial and agricultural wastes, or human and animal sewage. Urban runoff often contains high concentrations of chloride in the winter due to the application of road salt. Chlorides are generally not harmful. Allowable concentrations in drinking water are based on palatibility requirements rather than on health considerations. The water quality objective for domestic drinking water supplies in Ontario is 250 mg/L.

4. Conductivity

Conductivity is defined as the reciprocal of a water's electrical resistence (in ohms) between two electrodes one square centimeter in area and one centimeter apart at a standard temperature at 25^{o}C. It is a measure of the ion concentration in water. In natural waters conductivity is mainly due to calcium, magnesium, sodium, potassium, bicarbonate, chloride, sulfate, and nitrate ions. Conductivity can be correlated with dissolved solids content. In Ontario the dissolved solids content is equal to 0.65 $\pm$ 0.10 times the conductivity. The permitted level for conductivity in drinking water in Ontario is indirectly established by the limit for dissolved solids.

5. Hardness

Hardness, defined as the soap neutralizing power of water, can be expressed in terms of an equivalent concentration of calcium carbonate. Hardness is mainly attributable to the presence of calcium and magnesium ions resulting from the natural accumulation of salts during contact with soil and geological formations. Hardness is objectionable because it reduces the efficiency of soap and it can produce scums and scales. Hardness in drinking water is limited indirectly by the criteria for dissolved solids (maximum of 500 mg/L). Concentrations over 120 mg/L become increasingly inconvenient.

6. Iron

Iron is the most abundant of the heavy metals in nature but despite this abundance it is generally found in relatively low concentrations in natural surface waters. In groundwater, however, conditions may be such that high concentrations of iron remain in solution. Iron concentrations occur in water due to the leaching of soluble iron salts from soil and rocks. Iron is non-toxic even at high concentrations but becomes objectionable in water because of the taste and odour it imparts. It also tends to precipitate as hydroxides staining laundry and porcelain fixtures. Also, ferric iron combines with the tannin in tea to produce a dark violet colour. The water quality objective for drinking water in Ontario (0.3 mg/L) is based on aesthetic and taste considerations.

7. Manganese

Manganese is a common element in nature and found in numerous minerals which include pyrolusite, braunite, manganesespat. It is essential in trace quantities for the proper nutrition of both plants and animals. Although manganese is non-toxic at levels commonly encountered in water supplies, it can cause unpleasant tastes and stain laundry and plumbing fixtures. Iron and manganese are commonly found together.

8. Nitrate Nitrogen

Nitrates are the end products of the aerobic stabilization of organic nitrogen and as such they occur in polluted waters that have undergone self-purification. They can occur in groundwater as a result of leachings from cesspools or fertilized soil. Photosynthetic action is constantly utilizing nitrates and converting them to organic nitrogen in plant cells but in groundwater this action is not possible and high concentrations of nitrates can result. Nitrates are undesirable because their nutritive properties promote the growth of algae and other aquatic plants. Although nitrates are considered non-toxic to adults, high levels in domestic water supplies can lead to a condition known as infant methemoglobinemia in which the oxygen carrying capacity of the blood is inhibited. The maximum acceptable level of nitrates for domestic water supplies in Ontario is 10 mg/L if the water is to be used for infant feeding.

9. pH

The symbol pH is used to designate the logarithm (base 10) of the reciprocal of the hydrogen ion activity. In the case of natural waters the hydrogen ion activity closely approximates the hydrogen ion concentrations in moles per litre. Although the hydrogen ion is a potential pollutant in itself, pH is also intimately related to the concentrations of many other substances. The degree of dissociation of many substances is influenced by pH and since the undissociated compounds are frequently more toxic than the ionic forms pH may be a highly significant factor in determining limiting concentrations. Also the hydrogen ion concentrations is important because it affects the taste and corrosivity of water and the efficiency of chlorination.

10. Sodium

Sodium ranks sixth in the natural order of elemental abundance and is normally the principal ion in brackish or saline groundwater. It is important for all life forms and is generally considered non-toxic. Patients with high blood pressure however are usually warned to avoid the consumption of water containing high concentrations of sodium. Waters softened by the ion-exchange process employed in most domestic water softening equipment, generally contain high levels of sodium.

11. Sulfates

Sulfates occur naturally in water as a result of leachings from minerals. Sulfates may also occur as the final oxidized stage of sulfides, sulfites, and thiosulfates, as the oxidized state of organic matter in the sulfur cycle and as a result of industrial wastes. Water high in sulfates tends to form hard scales on plumbing and increase the corrosiveness of water towards concrete. Under anoxic conditions sulfates serves as an oxygen source for bacteria which convert it to hydrogen sulfide gas. The maximum sulfate concentrations permissible for domestic water supplies in Ontario is 250 mg/L. Although the limit is not based on taste or physiological considerations, concentrations over the limits may exert a cathartic effect on the gastro-intestinal tract.

12. Turbidity

Turbidity is a measure of the optical properties of a water sample. It is attributable to suspended and colloidal matter which diminishes the penetration of light. Turbidity is useful in assessing water clarity. In Ontario turbidity is measured in Formazin Units.

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